

REMARKS

In the final Office Action, claims 1, 3 and 4 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,282,652 to Ballas ("Ballas"). The Examiner stated that Ballas discloses a bush cutting machine 11 including a pipe-shaped operation rod 12, a motor 17 mounted to a proximal end of the rod 12, a drive shaft extending through the rod 12 and driven by the motor 17, a cutting tool 14 located at a distal end of the rod 12 and rotated by the drive shaft, a bar 21 mounted at a fixing point between the motor 17 and the cutting tool 14, and right and left handgrips 26, 29 mounted to distal ends of the bar. The Examiner further stated that the handgrips 26, 29 are mounted proximate to a center of gravity of a sum of mass of the respective handgrips 26, 29 and a portion 22, 23 of the bar 21 which extends between the fixing point and a respective one of the distal ends of the bar 21. In particular, the Examiner pointed out that the handgrips 26, 29 are mounted to the distal ends of each side 22, 23 of the bar 21 and are located closely adjacent to the center of gravity along the support tube 12 of the cutting apparatus 11, so that the center of gravity of the sum of the mass of each side 22, 23 of the bar 21 and its respective handgrip 26, 29 is inherently located to be close to the mounting location of the handgrip 26, 29.

Claims 2, 8, 11 and 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ballas in view of U.S. Patent No. 3,344,684 to Steere ("Steere"). Steere was cited as disclosing a handgrip 40 including a mounting portion 43 that is in contact with a bar 46 and escape portions that are not in contact with the bar 46.

Claims 5-7, 9, 10 and 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ballas in view of Steere, and further in view of Higashi. Higashi was cited as disclosing a throttle lever 109 mounted on a handgrip 103 formed of two grip halves 103a, 103b having inner peripheral surfaces forming a mount portion of the handgrip and held in contact with an outer circumferential surface of a bar 102.

By the present amendment, claims 1 and 8 have been amended in a minor clarifying respect to make it clear that the "sum" recited in claims 1 and 8 refers to a mass of a respective handgrip and a mass of a portion of a bar extending between a fixing point and a respective one of the distal ends of the bar. Applicants most respectfully request entry of the foregoing amendments since they are merely clarifying in nature. Thus, no further consideration or search is necessitated by the amendments. Thus, entry of the foregoing amendments should not be denied.

Applicants respectfully traverse the prior art grounds of rejection and submits that the improved grip mounting structure of the inventive vegetation cutting apparatus is neither disclosed nor suggested by the cited references to Ballas, Steere, or Higashi, taken alone or in combination.

Known methods employed to reduce the transmission of motor vibration to handgrips of vegetation cutting machines rely largely upon the use of vibration-absorbing handgrips. No known methods rely upon the mounting of a bar containing the handgrips at a certain location near a center of gravity, and mounting the handgrips on the bar at certain locations near a center of gravity of the bar as urged by the Examiner.

More specifically, there are no prior art handgrip mounting structures in which the handgrips of a vegetation cutting apparatus are mounted at or proximate to a center of gravity of a combined mass of a portion of a handle bar extending from a mounting portion to a distal end at which a respective handgrip is attached, as required by independent claims 1 and 8.

In accordance with the present invention recited by independent claim 1, the claimed vegetation cutting apparatus comprises an elongated operation rod, a motor mounted to a proximal end of the rod, a drive shaft extending through the

rod and driven by the engine, a cutting tool provided at a distal end of the operation rod to undergo rotation with the drive shaft, a handle comprised of a bar attached at a fixing point to the operation rod between the engine and the cutting tool, and right and left handgrips mounted to distal ends of the bar, each grip being mounted at or proximate to a center of gravity of a sum of a mass of the respective handgrip and a mass of a portion of the bar extending between the fixing point and the distal end of the bar. Independent claim 8 also contains the above-underlined language.

Accordingly, each of independent claims 1 and 8 requires that the handgrips are mounted at a specific location.

When vibration is transferred to a bar provided with a knot or a flange, the amplitude of the vibration is greatly diminished at the knot or flange. Applicants have discovered that the same phenomenon occurs at or near the center of gravity of the bar. Thus, in accordance with the present invention recited by independent claims 1 and 8, the handgrips are provided at or proximate to the center of gravity of the sum of the masses of the respective handgrip and a portion of the bar extending between the fixing point and the distal end of the bar so that the amplitude of vibration transferred from the handle to the handgrips is small. Vibration transferred

from the bar to the handgrips can thus be diminished with an increased efficiency without requiring a complex arrangement.

In the embodiment shown in Fig. 1 of the application drawings, the vegetation cutting machine 10 has a pipe-shaped operation rod 11, an engine 14 mounted to a base portion 13 of the operation rod 11, and a disc-shaped cutting tool 16 carried at a distal end 15 of the operation rod 11. A drive shaft 12 is incorporated within the operation rod 11 and is rotated by the drive power of the engine 14. Rotation of the drive shaft 12 causes the cutting tool 16 to rotate. A U-shaped handle 18 for operating the cutting machine 10 is fixedly secured to the operation rod 11 at an intermediate portion thereof between the engine 14 and the cutting tool 16 via a handle holder 19.

The handle 18 is comprised of a bar having left and right portions provided with handgrips 20, 30. The right handgrip 30 has a throttle lever 41 for controlling the engine 14 and a lock lever 42.

Vibration caused by operation of the engine 14 is transferred to the operator via the handle 18 and through the handgrips 20, 30. In particular, since the cutting machine 10 compels the engine 14 to rotate the cutting tool 16 via the drive shaft 12, vibration transferred to the handgrips 20, 30 from the operation rod 11 via the handle 18 generally has a

large amplitude in a rotational direction. The present invention reduces vibrations in such a direction as much as possible by employing the following structure.

As shown in Fig. 4, a portion of the handle 18 extending from a fixing point PL1 on a left side of the handle holder 19 has a mass of mL1 (hereinafter referred to as "left handle mass mL1"), while the left grip 20 has a mass of mL2 (hereinafter referred to as "left grip mass mL2"). The total mass of the left side is mL3, which is the sum of the left handle mass mL1 and the left handgrip mass mL2 ($mL3 = mL1 + mL2$). The sum mL3 of the left side mass has a center of gravity as at GL. The invention recited by independent claims 1 and 8 is characterized in that the left grip 20 is mounted to the handle 18 at (or proximate to) its center of gravity GL corresponding to the sum of the left side mass mL3. The right handgrip has a similar structure.

In addition, the grips have escape portions formed in areas except for mount portions to be fixed to the handle for preventing other portions from being brought into contact with the handle. Since the grips are kept out of contact with the handle at the areas remote from the mount portions, there is no chance for vibrations of large amplitude to be transferred from the handle to the grips. As a result, the grips can be maintained in a condition wherein the least vibrations are transferred from the handle.

No corresponding structure is disclosed or suggested by the prior art of record.

Ballas does not anticipate or render obvious the claimed invention. Ballas discloses a handle assembly 21 comprised of a bar connected to a center of gravity of a vegetation cutting apparatus. However, Ballas does not disclose or suggest handgrips mounted at or proximate to a center of gravity of a sum of a mass of the respective handgrip and a portion of the bar extending between the fixing point and the distal end of the bar. In fact, even a cursory examination of Fig. 2 of Ballas reveals that the handgrips 26 29 are mounted far behind a center of gravity of the sum of the masses of the heavy metal bar portions 22, 23 and the lightweight rubber handgrips 26, 29. To conclude otherwise is obvious error.

Ballas discloses a vegetation cutting apparatus having a motor 17 and a rotating cutting head 14 mounted at opposite ends of a support tube 12, and a handle assembly 21 comprised of first and second tubular handle members 22, 23 having cylindrical handgrips 26, 29 at their free ends and secured by a clamp 24 to a straight portion 13 of the support tube 12 near a center of gravity of the apparatus. The handle members have straight and curved portions arranged in combination so that the handgrips reside in a common plane and

with substantially the same angular displacement at the user's hands with the cutting head positioned directly in front of the user's body so that the user has a comfortable stance with the cutting head and can make equal left and right swings without any undue strain or effort during vegetation cutting.

The distribution of mass provided by the motor 17, the support tube 12 and the cutting head 14 produces a center of gravity along the straight portion 13 of the support tube 12. The handle assembly 21 is connected to the support tube 12 along this center of gravity so that the handgrips reside closely adjacent the center of gravity. However, the handgrips clearly do not reside at or proximate to a center of gravity of a sum of a mass of the respective handgrip and a portion of the bar extending between the fixing point and the distal end of the bar as recited by independent claims 1 and 8.

Ballas does not expressly or inherently disclose that the handgrips are mounted at or proximate to a center of gravity of a sum of a mass of the respective handgrip and a portion of the bar extending between the fixing point and the distal end of the bar. As can clearly be seen in Figs 1 and 2 of Ballas, the handgrips 26 29 are mounted substantially behind the center of gravity of the sum of the masses of the heavy metal bar portions 22, 23 and the lightweight rubber

handgrips 26, 29. Nothing in the disclosure of Ballas would suggest a different construction.

The cutting apparatus of the present invention has a bar-shaped handle fixed to an operation rod and right and left handgrips mounted to distal end portions of the handle, each of the grips being mounted at or proximate to a center of gravity of a sum of a mass of a portion of the bar extending between a fixing point and a respective one of the distal ends of the bar and a mass of the respective grip. Ballas does not disclose or suggest the claimed structure.

Neither Steere nor Higashi cures the foregoing defects. Steere discloses handgrips discloses substantially behind the center of gravity recited in claims 1 and 8. Higashi discloses a bush cutting machine 10 having a pipe-shaped operation rod 15, an engine 13 mounted to a proximal end of the operation rod, a transmission shaft 16 extending through the operation rod 15 and driven by the engine 13, a cutting tool 14 provided at a distal end of the operation rod 15 and rotated by the drive shaft 16, a bar-shaped handle 17 fixed to an arbitrary position of the operation rod 15 between the prime mover 13 and the cutter 14, and a right grip 20 and a left grip 18 mounted to distal ends of the handle 17.

However, Higashi does not disclose or suggest mounting of the handgrips in a position in close proximity to the claimed center of gravity.

Accordingly, applicants respectfully submit that claims 1-13 patentably distinguish over the prior art of record and that the anticipatory and obviousness rejections should be withdrawn.

In view of the foregoing amendments and discussion, the application is now believed to be in condition for allowance. Accordingly, favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

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